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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/188,190	11/10/1998	KATSUNORI KANEKO	1472-177P	4015

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EXAMINER	
NGUYEN, TU MINH	
ART UNIT	PAPER NUMBER
3748	33

DATE MAILED: 03/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/188,190	Kaneko et al.
Examiner	**Art Unit**
Tu M. Nguyen	3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Mar 6, 2003*.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1 and 3-15* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1 and 3-15* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *Oct 2, 2002* is/are a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. An Applicant's Request for Continued Examination (RCE) and an Applicant's Amendment filed on March 6, 2003 have been entered.

Claim 2 has been canceled; claims 5-7 and 10-13 have been amended; and claim 15 has been added. Overall, claims 1 and 3-15 are pending in this application.

Drawings

2. The formal drawing of Figure 5 filed on October 2, 2002 has been approved for entry.

Claim Objections

3. Claim 1 is objected to because on line 7 of the claim, "and" should be deleted. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

> A person shall be entitled to a patent unless --
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.
>
> The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 1, 5, and 8-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Hepburn et al. (U.S. Patent 5,974,788).

Re claim 1, as shown in Figure 1, Hepburn et al. disclose an exhaust gas purifying apparatus of an internal combustion engine, comprising:

- a light-off catalyst (26) provided in an exhaust passage and having a O_2 storage capability such that the light-off catalyst passes, therethrough, at least one of HC and CO in an exhaust gas to a downstream side of the light-off catalyst when the internal combustion engine is operating under a condition where the oxygen concentration of the exhaust gas is reduced (lines 44-52 of column 4 and line 63 of column 3 to line 10 of column 4);

- exhaust gas purifying means (32) provided in the exhaust passage at a downstream of and in series with the light-off catalyst, the exhaust gas purifying means having a NO_x catalyst (an NO_x trapping material) for adsorbing NO_x in an exhaust gas when an air-fuel ratio of the exhaust gas is lean and releasing the adsorbed NO_x in an exhaust gas when the oxygen concentration of the exhaust gas is reduced, the exhaust gas purifying means further having a three-way catalyst (a noble metal) that reacts with the released NO_x (the purifying means (32) of Hepburn removes HC, CO, and NO_x in the exhaust gas at stoichiometric or slightly rich condition (lines 13-18 and 39-48 of column 1)); and

- control means (20, 16) for reducing the oxygen concentration in the exhaust gas such that the at least one of HC and CO that passed through the light-off catalyst is introduced to the NO_x catalyst when an NO_x conversion efficiency of the NO_x catalyst is decreased (as indicated on

lines 23-25 of column 1 and lines 64 of column 2 to line 5 of column 3, during a lean mode in the apparatus of Hepburn et al., in addition to NO_x, SO_x also accumulates in the exhaust gas purifying means (32), occupying the storage sites that would be otherwise used to store NO_x. This causes a reduction in NO_x conversion efficiency of the purifying means (32). Thus, to restore the NO_x conversion efficiency of the purifying means, the SO_x stored in the purifying means (32) are occasionally purged and "burned" off by modulating the amplitude of the air-fuel ratio at a properly chosen frequency to create a rich break-through of the light-off catalyst. In this way, an atmosphere having large unburned HC and CO concentration is produced around the exhaust gas purifying means for the effective purging and reduction of SO_x).

Re claim 5, in the apparatus of Hepburn et al., the light-off catalyst (26) has the oxygen storage capability of a first value; and the three-way catalyst of the exhaust gas purifying means (32) has an oxygen storage of a second value greater than the first value (lines 48-50 of column 4).

Re claim 8, in the apparatus of Hepburn et al., the internal combustion engine is a spark ignition type four-cycle engine that operates on the four-stroke cycle consisting of a suction stroke, compression stroke, combustion/expansion stroke, and exhaust stroke.

Re claim 9, in the apparatus of Hepburn et al., the internal combustion engine is an in-cylinder injection type engine in which fuel is directly injected into a combustion chamber (lines 3-6 of column 2).

Re claims 10 and 11, the single catalyst of the exhaust gas purifying means (32) in the apparatus of Hepburn et al. includes a function of the three-way catalyst.

Re claim 12, the light-off catalyst (26) in the apparatus of Hepburn et al. includes a single catalyst that functions as the three-way catalyst (lines 12-13 of column 2).

Re claim 13, the exhaust gas purifying means (32) in the apparatus of Hepburn et al. further functions also as the NO_x catalyst.

Re claim 14, the light-off catalyst (26) in the apparatus of Hepburn et al. also functions as a SO_x catalyst to oxidize and convert SO_2 in the exhaust gas to a sulfate which can be absorbed by the exhaust gas purifying means.

Re claim 15, in the apparatus of Hepburn et al., the condition where the oxygen concentration of the exhaust gas is reduced includes at least one of a stoichiometric operating condition and a fuel rich operating condition (lines 40-49 of column 3).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. as applied to claim 1 above, in view of design choice.

The exhaust gas purifying apparatus of Hepburn et al. discloses the invention as cited above, however, fails to disclose that an amount of oxygen absorbed on the light-off catalyst is not greater than about 150 cc per one-liter volume of the catalyst when measured by an oxygen pulse method and that an oxygen component stored in the light-off catalyst is not greater than about 25 gr per one-liter volume of the catalyst.

One having ordinary skill in the art of exhaust emission control would have recognized that the specification of the maximum volumetric or weighted amount of oxygen absorbed in a light-off catalyst would be a function of many variables such as the size of the light-off catalyst, engine size, engine operating conditions (load, speed, etc), air and fuel properties, capacity and size of a main catalyst, etc. Moreover, there is nothing in the record which establishes that the claimed maximum volumetric or weighted amount of oxygen absorbed in a light-off catalyst presents a novel of unexpected result (See *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975)).

8. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. as applied to claim 5 above, in view of design choice.

The exhaust gas purifying apparatus of Hepburn et al. discloses the invention as cited above, however, fails to disclose that an amount of oxygen absorbed on the three-way catalyst of the exhaust gas purifying means is not greater than about 150 cc per one-liter volume of the

catalyst when measured by an oxygen pulse method and that an oxygen component stored in the three-way catalyst of the exhaust gas purifying means is not greater than about 25 gr per one-liter volume of the catalyst.

One having ordinary skill in the art of exhaust emission control would have recognized that the specification of the maximum volumetric or weighted amount of oxygen absorbed in the exhaust gas purifying means would be a function of many variables such as the size of the exhaust gas purifying means, engine size, engine operating conditions (load, speed, etc), air and fuel properties, capacity and size of a main catalyst, etc. Moreover, there is nothing in the record which establishes that the claimed maximum volumetric or weighted amount of oxygen absorbed in the exhaust gas purifying means presents a novel of unexpected result (See *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975)).

Communication

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (703) 308-2833.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (703) 308-2623. The fax phone number for this group is (703) 308-7763.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-1148.

Tu M. Nguyen

TMN

March 21, 2003

Tu M. Nguyen

Patent Examiner

Art Unit 3748

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